

**TDRSS Orbit Determination**

**UPN 315-90-11**

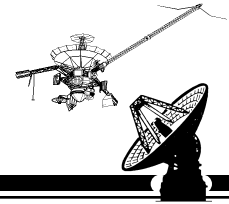
**David Zillig**

**Semi-Annual Review of the FY97 SOMO/MO&DSD  
Technology Development Program**

**April 15, 1997**

# TDRSS Orbit Determination

## Objective and Significance

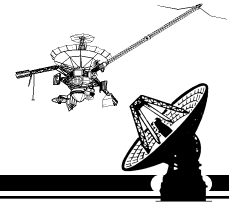
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### Overall Objective

*To determine modifications to existing approach to TDRSS Orbit Determination (OD) that provide the enhanced accuracy and reduced time to orbit recovery (after a TDRS maneuver) required by evolving user missions.*

<u>Goals</u>	<u>Significance</u>
<b>#1: Establish requirements and define candidate options for meeting these requirements.</b>	<ul style="list-style-type: none"><li>• This goal assures that study scope is well defined and that needed performance goals are established.</li></ul>
<b>#2: Perform tracking performance trades for the various alternative tracking methods under examination:</b> <ul style="list-style-type: none"><li>– Steady-state performance.</li><li>– TDRSS orbit recovery after maneuver.</li></ul>	<ul style="list-style-type: none"><li>• Trades define set of approaches available for meeting performance requirements.</li></ul>
<b>#3: Assess implementation and operations considerations for each major alternative and option within each major alternative:</b> <ul style="list-style-type: none"><li>– Costs vs. benefits.</li></ul>	<ul style="list-style-type: none"><li>• Determination of best choice for enhanced tracking performance depends on many factors other than just tracking performance.</li></ul>

## TDRSS Orbit Determination

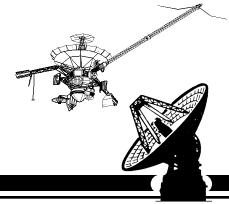


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### FY97 Accomplishments

- **Established key requirements (based on EOS mission needs):**
  - Steady state tracking 3-sigma TDRS position error less than 75m.
  - Recovery of TDRS orbit after TDRS maneuver in less than 2 hrs.
- **Defined key candidates for meeting the requirements:**
  - Demand Access Ranging and Tracking System (DARTS):
    - Relies on ranging to multiple remote ground sites.
  - Joint TDRS/User Tracking (JTUT):
    - Use range/Doppler measurements to both TDRS and TDRS user (e.g., TOPEX, EOS-AM) to develop TDRS orbit.
  - Combination of both approaches
- **Defined options for improved performance within each major orbit determination candidate:**
  - Site survey precision.
  - Ionospheric correction.
  - Tropospheric correction.
  - Number/locations of ground sites used for tracking (DARTS).

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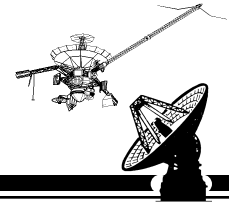


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### **FY97 Accomplishments (Cont'd)**

- **Developed candidate approaches to meeting near-term EOS-AM OD requirements.**
- **Assessed JTUT implementation and operations considerations to meet EOS-AM requirements until DARTS is implemented.**
- **Established plan to address BRTS site survey precision, tropospheric error, ionospheric error and WSC Ku-band TT&C ranging errors.**

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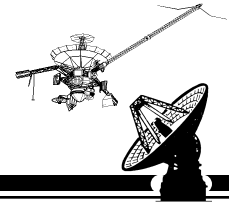


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### **FY97 Goals**

- **Continue development of DARTS system architecture:**
  - **Refine existing candidate implementations.**
  - **Select most appropriate candidate (based on implementation, performance, and operations considerations).**
  - **Perform detailed system engineering for best candidate.**
- **Verify/extend previously obtained ODEAS analytical tracking performance estimates using collected tracking measurements:**
  - **FDF data and support anticipated.**
- **Develop transition approach to meet EOS-AM accuracy requirements.**

# TDRSS Orbit Determination Schedule


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Task	FY97				FY98				FY99
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1/2:Q3/4
1. TDRSS OD performance assessments									
- Assessments based on measured data									
2. Implementation/operations analysis and assessments									
- DARTS/JTUT assessments									
- DARTS assessment/system engineering									
- Transition plan to meet EOS-AM Requirements									
Notes:									
1. FY98 activity depends on results obtained from effort in FY97									